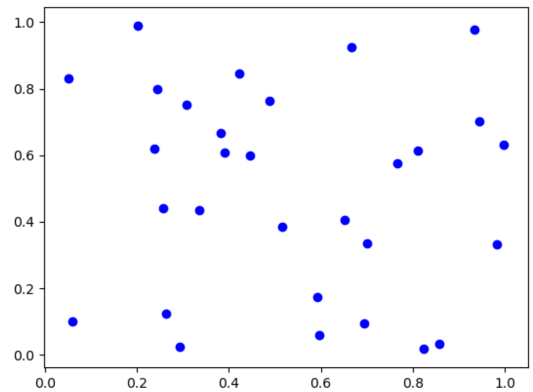
1. Determine the appropriate model for the graph of points below.



A. Logarithmic model

B. Exponential model

C. Linear model

D. Non-linear Power model

E. None of the above

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2. A town has an initial population of 60000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	59965	59925	59885	59845	59805	59765	59725	59685	59645

A. Non-Linear Power

B. Exponential

C. Linear

D. Logarithmic

E. None of the above

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3. Using the scenario below, model the population of bacteria α in terms

of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 2 bacteria-α. After 1 hours, the petri dish has 12 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 32 minutes

B. About 22 minutes

C. About 133 minutes

D. About 194 minutes

E. None of the above

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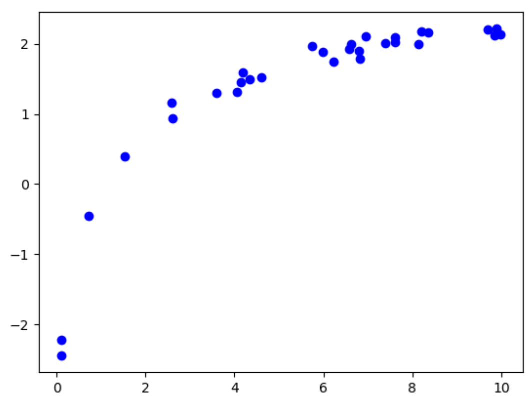
4. Determine the appropriate model for the graph of points below.



A. Exponential model

B. Non-linear Power model

C. Logarithmic model

D. Linear model

E. None of the above

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5. A town has an initial population of 20000. The town's population for the next 10 years is provided below. Which type of function would be most appropriate to model the town's population?

Year	1	2	3	4	5	6	7	8	9
Pop	20000	19986	19978	19972	19967	19964	19961	19958	19956

A. Exponential

B. Logarithmic

C. Linear

D. Non-Linear Power

E. None of the above

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6. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of $160°$ *C and is placed into a* $10°$ *C bath to cool. After 24 minutes, the uranium has cooled to* $120°$ *C.*

A. $k = -0.03258$

B. $k = -0.01292$

C. $k = -0.03224$

D. $k = -0.01561$

E. None of the above

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7. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is initially 576 grams of element X and after 3 years there is 64 grams remaining.

A. About 1 day

B. About 0 days

C. About 1460 days

D. About 365 days

E. None of the above

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8. Using the scenario below, model the population of bacteria α in terms of the number of minutes, t that pass. Then, choose the correct approximate *(rounded to the nearest minute)* replication rate of bacteria-α.

A newly discovered bacteria, α, is being examined in a lab. The lab started with a petri dish of 4 bacteria-α. After 2 hours, the petri dish has 264 bacteria-α. Based on similar bacteria, the lab believes bacteria-α triples after some undetermined number of minutes.

A. About 268 minutes

B. About 19 minutes

C. About 119 minutes

D. About 44 minutes

E. None of the above

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9. Using the scenario below, model the situation using an exponential function and a base of $\frac{1}{2}$. Then, solve for the half-life of the element, rounding to the nearest day.

The half-life of an element is the amount of time it takes for the element to decay to half of its initial starting amount. There is *initially 861 grams of element X and after 6 years there is 123 grams remaining.*

A. About 730 days

B. About 2555 days

C. About 1095 days

D. About 1 day

E. None of the above

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10. The temperature of an object, T, in a different surrounding temperature T_s will behave according to the formula $T(t) = Ae^{kt} + T_s$, where t is minutes, A is a constant, and k is a constant. Use this formula and the situation below to construct a model that describes the uranium's temperature, T, based on the amount of time t (in minutes) that have passed. Choose the correct constant k from the options below.

Uranium is taken out of the reactor with a temperature of 170° *C and is placed into a* 15° *C bath to cool. After 37 minutes, the uranium has cooled to* 122° *C.*

A. $k = -0.01002$

B. $k = -0.02058$

C. $k = -0.01251$

D. $k = -0.02090$

E. None of the above
